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PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Method of Covering Articles

We, BAKELITE XYLONITE LIMITED, a British Company, of 27 Blandford Street, London, W.1., do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method for covering articles or parts of articles.

The present invention provides a method for covering furniture, for example, chairs, sofas, car-seats, etc., and other articles or parts of articles by heat-shrinking thereon a heat-shrinkable material obtained from a laminate comprising a layer of a non-woven fabric consisting of a fleece of partially drawn monofilaments of a thermoplastic polymeric material bonded together with a thermoplastic binder, and a layer of flexible plasticised or unplasticised thermoplastic orientable material.

The laminate is rendered heat shrinkable by bringing it to a softened condition by heating it to an elevated temperature, deforming the laminate whilst it is in the softened condition and cooling the deformed laminate so that after cooling it retains the configuration to which it has been deformed.

The expression "softened condition" means that at least the flexible thermoplastic layer of the laminate is in a conditition which allows stretch orientation of its molecules, and the thermoplastic binder is in a condition which allows the non-woven fabric to stretch with the flexible thermoplastic layer. The temperature at which the stretching of the laminate is carried out should be below the melting temperature of the material of the non-woven fleece and is preferably below the melting temperature of the thermoplastic binder.

The layer of flexible thermoplastic orientable material may comprise, for example, polyvinyl chloride or another vinyl polymer or copolymer, a polyolefin, for example, polypropylene, an acrylonitrile/butadiene/styrene copolymer, or a mixture of such a copolymer with polyvinyl chloride, and may be prepared by any desired method, for example, calendering or casting.

The non-woven fabrics, which are preferably those described in Specification No. 1,118,450, may consist of a fleece of partially drawn monofilaments of a polyamide, for example, nylon, a polyester, for example, polyethylene terephthalate, or a polyolefin, for example, polypropylene, bonded together by any desired thermoplastic binder. The preferred material is that marketed under the Registered Trade Mark of "Vliesette 35/432" by Bondina (Sales) Ltd., and comprises a fleece of partially drawn monofilaments of nylon bonded together with an acrylonitrile/butadiene copolymer.

The lamination of the non-woven fabric to the flexible thermoplastic sheet may be effected in any desired manner. The lamination of the non-woven fabric to, for example, flexible polyvinyl chloride may be effected either by spreading a polyvinyl chloride plastisol onto the fabric and subsequently curing the plastisol or by laminating together the two components using an adhesive. Preferably, when an adhesive is used, it is not a solvent-based adhesive. Especially suitable adhesives for polyvinyl chloride are polyvinyl chloride plastisols. Any adhesive used should have sufficient resilience to maintain the bond between the non-woven fabric and the thermoplastic layer during the deforming operation.

The laminate, before deformation, will generally be in the form of a flat sheet and may be deformed either by stretching the sheet in

one direction or in two mutually perpendicular directions or by a shaping operation, for example, vacuum forming, drape moulding or deep drawing under temperature conditions such that the laminate is in the softened condition, (as hereinbefore defined). The product of such a shaping operation will hereinafter be referred to as a "forming." For example, in the case of a laminte of a non-woven fabric and polyvinyl chloride the temperature at which the deformation operation may be carried out is between 110°C and 140°C preferably between 120°C and 135°C.

To carry out the process of the invention an article or part of an article is covered with the heat-shrinkable laminate so that when the laminate is subsequently heated and shrinks it becomes tensioned in at least one direction. The laminate is then cooled.

The heat shrinkable laminate may be applied to the article in individual panels, as an assembly of panels stitched or welded together, or as a forming (as hereinbefore defined).

The free edges of the laminate may be secured to the article by any means, for example, tacking, stapling, sticking etc. provided that the securing means will withstand the heat treatment required to shrink the laminate and will also withstand the shrinkage forces set up in the laminate during the shrinkage treatment.

By "free edges" there is meant those parts of the laminate that bound any area which is desired to be brought under tension by the heat shrinkage treatment.

The heat shrinkage treatment may be carried out on the laminate to effect overall shrinkage, for example, by heating the whole in a hot air oven, or in selected areas only by means of, for example, a hot air gun. In the latter case the area being treated need not necessarily be bounded directly by means securing the laminate to the article. Where the article is being covered with a three dimensional heat-shrinkable forming (as hereinbefore defined) of the laminate it may not be necessary to secure the free edges of the laminate by any separate securing means, since if the free edges overhang, say, the base of the article, when they are heated to the heat-shrinkage temperature they will shrink into closer contact with the article and thus adequately secure the laminate to the article.

The temperature at which the heat shrinkage treatment is carried out is dependent to a great extent on the temperature at which the stretching or deforming operation was carried out, also on the percentage of the original stretch or deformation that it is desired to recover. The heat shrinkage treatment for a laminate of a non-woven fabric and polyvinyl chloride deformed in the temperature range 120°C to 135°C is suitably carried out such that the laminate reaches a temperature of approximately 70°C.

The following example illustrates the invention.

A laminate comprising a non-woven fleece of partially drawn nylon monofilaments bonded together using an acrylonitrile butadiene copolymer latex, with subsequent curing, having a thickness of 0.008 inch, and an 0.020 inch thick sheet of plasticized polyvinyl chloride (425 mix "Velbex" Registered Trade Mark) manufactured by Bakelite Xylonite Ltd.) was stretched at a temperature of approximately 125°C. on a biaxial stretching apparatus to a stretch ratio of 1.5 : 1 in both directions. The laminate was then cooled while still under the influence of the stretching forces so that the stretch was retained in the laminte. The resulting material which had a shrink-back property of 10 to 15% in each of the two directions was used to cover a chair in the following way: the laminate was applied to the padded chair in convenient panels and the edges of the laminate covering each section secured to the frame of the chair by means of staples. The thus-covered chair was then passed through a hot-air oven, with an air temperature of approximately 110C. such that the laminate reached a temperature of approximately 70°C., whereupon the laminate was observed to shrink so that it became taut against the padding of the chair.

WHAT WE CLAIM IS:—

1. A method for covering articles or parts of articles, which comprises heat-shrinking thereon a heat-shrinkable material obtained from a laminate comprising a layer of a non-woven fabric consisting of a fleece of partially drawn monofilaments of a thermoplastic polymeric material bonded together with a thermoplastic binder, and a layer of flexible plasticised or unplasticised thermoplastic orientable material, the laminate being rendered heat-shrinkable by bringing it to a softened condition (as hereinbefore defined) by heating it to an elevated temperature, deforming the laminate whilst it is in the softened condition and cooling the deformed laminate so that after cooling it retains the configuration to which it has been deformed.

2. A method as claimed in claim 1, wherein the layer of flexible thermoplastic orientable material is a vinyl polymer or copolymer, a polyolefin, an acrylonitrile/butadiene/styrene copolymer or a mixture of an acrylonitrile/butadiene/styrene copolymer with polyvinyl chloride.

3. A method as claimed in claim 1, wherein the layer of flexible thermoplastic orientable material is polypropylene.

4. A method as claimed in claim 1, wherein the layer of flexible thermoplastic orientable material is polyvinyl chloride.

5. A method as claimed in any one of claims 1 to 4, wherein the layer of flexible thermoplastic orientable material has been prepared by calendering or casting.

6. A method as claimed in any one of claims 1 to 5, wherein the non-woven fabric consists of a fleece of partially drawn monofilaments of a polyamide, a polyester or a polyolefin bonded together with a thermoplastic binder.

7. A method as claimed in claim 6, wherein the non-woven fabric consists of a fleece of partially drawn monofilaments of nylon, polyethylene terephthalate or polypropylene bonded together with a thermoplastic binder.

8. A method as claimed in claim 7, wherein the non-woven fabric comprises a fleece of partially drawn nylon monofilaments bonded together with an acrylonitrile/butadiene copolymer.

9. A method as claimed in any one of claims 1 to 8, wherein the laminate before deformation is in the form of a flat sheet and is deformed either by stretching the sheet in one direction or in two mutually perpendicular directions or by a shaping operation.

10. A method as claimed in claim 9, wherein the shaping operation comprises vacuum forming, drape moulding or deep drawing.

11. A method as claimed in any one of claims 1 to 10, wherein the heat-shrinkable laminate is applied to the article in individual panels or as an assembly of panels stitched or welded together.

12. A method as claimed in any one of claims 1 to 10, wherein the heat-shrinkable laminate is applied to the article as a forming (as hereinbefore defined).

13. A method as claimed in any one of claims 1 to 12, wherein the free edges of the laminate (as hereinbefore defined) are secured to the article by securing means that will withstand the heat treatment required to shrink the laminate and will also withstand the shrinkage forces set up in the laminate during and after the shrinkage treatment.

14. A method as claimed in any one of claims 1 to 13, wherein the heat-shrinkage treatment is carried out on the laminate to effect overall shrinkage of the laminate.

15. A method as claimed in any one of claims 1 to 14, wherein the article to be covered is an article of furniture.

16. A method as claimed in claim 15, wherein the article to be covered is a chair, a sofa or a car seat.

17. A method as claimed in claim 1, conducted substantially as described in the Example herein.

18. Articles whenever covered by a method as claimed in any one of claims 1 to 7.

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